Floral bracts $0.5-0.6 \mathrm{~mm}$ long, $0.4-0.5 \mathrm{~mm}$ wide at the base, deltoid, glabrous. Pedicels 3.4 6.2 mm long, sparsely to densely covered with flexuous trichomes, $0.4-0.45 \mathrm{~mm}$ long. Floral buds $3-5 \mathrm{~mm}$ long, $1.5-3 \mathrm{~mm}$ diam., conical, with imbricate aestivation. Calyx lobes $1.3-2 \mathrm{~mm}$ long, $0.8-1.2 \mathrm{~mm}$ wide, ovate to triangular, apically acute, abaxially glandular, and with few trichomes. Corolla rotate, $2-5 \mathrm{~mm}$ long; lobes basally fused to fused for more than $1 / 4$ of their length, $1-1.5 \mathrm{~mm}$ wide, straight, recurved, oblong, apically obtuse, glabrous, green to yellow with brown median. Gynostegial corona white, tubular, $2-3.5 \mathrm{~mm}$ high, exceeding the gynostegium and entirely obscuring it; C (is) consisting of Cs and Ci fused for more than $3 / 4$ of total corona length; only Ci differentiated. Cs appressed to the back of the stamens. Ci laminar, keeled along the upper two thirds of corona length; lobes of Ci cucullate, triangular when flattened, erect to inflexed with laterally involute margins. Gynostegium $0.9-1 \mathrm{~mm}$ high, $1-1.1 \mathrm{~mm}$ diam., sessile. Stamens without filament. Anthers broader than high, trapezoidal, abaxially planar. Anther wings $0.35-0.45 \mathrm{~mm}$ long, not extending along the whole length of the anther, which forms a "pseudostipe" of $0.5-0.6 \mathrm{~mm}$ height; distal ridge striate; adjacent anther wings parallel to each other, in the same plane as the anther to centrifugal, forming a distinct "mouth" with the basal lateral margin of the anther. Connective appendages $0.38-0.4 \mathrm{~mm}$ long, $0.18-0.2 \mathrm{~mm}$ wide, ovate, narrower than the stamen, strongly inflexed. Pollinarium: corpusculum $0.13-0.15 \mathrm{~mm}$ long, margins of the corpuscular cleft parallel, basally widened; caudicles $0.1-12 \mathrm{~mm}$ long, cylindrical, convexly recurved; pollinia $0.22-0.25 \mathrm{~mm}$ long, $0.1-0.12 \mathrm{~mm}$ wide, elliptical in cross-section, clavate, apically attached to the caudicles. Stylar head $0.58-0.6 \mathrm{~mm}$ diam., $0.42-0.44 \mathrm{~mm}$ high; upper part $0.22-0.24 \mathrm{~mm}$ high, depressed-conical to conical.
C. lineare is by far the most frequent species in the complex of small "pseudolobe-formers". The corona form of $C$. lineare is encountered in several closely related species ( $C$. fimbriatum, C. napiferum and C. subtilis). However, these species are separable by at least slight floral differences, while the two subspecies here recognized are florally identical, but very distinctive vegetatively. The typical subspecies is characterized by linear, or at most, narrowly ovate leaves and a shortly pedunculate sciadioidal inflorescence while the new subspecies displays ovate leaves and longly pedunculate inflorescences. Tuberous roots have been confirmed only for the typical subspecies.

## Cynanchum lineare N.E. Br. subsp. lineare

Plants twining, sparsely branched from the base, $25-50 \mathrm{~cm}$ high. Subterranean organs a single tuber per plant; tuber $12-15 \mathrm{~cm}$ long, $2-2.5 \mathrm{~cm}$ diam., napiform, brown, warty. Shoots annual, $25-50 \mathrm{~cm}$ long, herbaceous, basally woody with brownish to greyish bark; densely covered with flexuous trichomes, $0.5-0.55 \mathrm{~mm}$ long; internodes $1.5-2.5 \mathrm{~cm}$ long, $1.5-2 \mathrm{~mm}$ diam. Leaves persistent; petiole $1-5 \mathrm{~mm}$ long; colleters absent. Leaf blades herbaceous, $40-65 \mathrm{~mm}$ long, $0.7-25 \mathrm{~mm}$ wide, linear or rarely narrowly ovate, oblong or obovate, basally cuneate, or rarely lobate, apically acute to acuminate with acumen $2.5-4 \mathrm{~mm}$ long, margins thickened, veins and margins sparsely covered with flexuous trichomes, $0.4-0.45 \mathrm{~mm}$ long.


Fig. 2.-Cynanchum lineare N.E. Br.: A, leaves (left, subsp. keraudreniae, Lavanchie s.n.; middle, subsp. lineare, broadleafed form, Scott Elliott 2089; right, subsp. lineare, typical form, Perrier de la Bâthie 14446); B, bud (subsp. keraudreniae, Lavanchie s.n.); C, flower; D, corona in top view; E, apical half of unfolded corona, adaxially; $\mathbf{F}$, gynostegium in relation to the corona (partially removed); G, pollinarium; H, stylar head; I, fruit; J, seed (subsp. lineare, Liede \& Conrad 2863). Drawings by G. Hintze.

Inflorescences bostrychoid to sciadioidal, 7-20-flowered, 4-7 flowers open at time. Peduncles $13.5-27 \mathrm{~mm}$ long, sparsely covered with flexuous trichomes, $0.4-0.45 \mathrm{~mm}$ long; rachis $0-16 \mathrm{~mm}$.

Follicles one per flower, pendulous, $55-60 \mathrm{~mm}$ long, $4-6 \mathrm{~mm}$ wide, obclavate, round in crosssection, apex shortly beaked, light brown to medium brown, longitudinally grooved. Seeds 4 5 mm long, $3.5-4 \mathrm{~mm}$ wide, ovate, medium brown, seta and aseta side indistinctly sculptured with longitudinal ridges, wing 0.5 mm wide, entire; coma 15-20 mm long.-Fig. 2, Map 2.

Chromosome number unknown.
DISTRIBUTION AND habitat.-Madagascar, prov. Antananarivo, Fianarantsoa, Mahajunga, Toliara; 1300-2300 m; on quartzite and gneiss, rocky ridges, ericoid scrub, scrubby forest, roadsides.

Flowering time.-October to April, June.
Literature.-Choux M.P. (1914): 352, with illustrations of habit and subterranean organs.

Cynanchum lineare N.E. Br. subsp. keraudreniae Liede, subsp. nov.

Structura floris non differt a subspecie typica, sed foliis nonlinearibus, $50-90 \mathrm{~mm}$ longis, $20-50 \mathrm{~mm}$ latis, pedunculibus 45-70 mm longis discrepans.

TyPE.-Keraudren 1594 (holo-, P !).
Plants twining. Subterranean organs unknown. Shoots glabrous; internodes $10-17 \mathrm{~cm}$ long, $1.5-2 \mathrm{~mm}$ diam. Leaves persistent; petioles $10-20 \mathrm{~mm}$ long; three colleters at the base of the leaves. Leaf blades slightly coriaceous, $50-90 \mathrm{~mm}$ long, $20-50 \mathrm{~mm}$ wide, ovate, basally cordate, apically acuminate, acumen $7.5-10 \mathrm{~mm}$ long, marginally slightly thickened, glabrous.

Inflorescences bostrychoid, 12-18-flowered, 5-10 flowers open at a time. Peduncles $45-70 \mathrm{~mm}$ long, glabrous; rachis $3.5-16 \mathrm{~mm}$ long. Flower size towards the larger end of total range.-Fig. 2, Map 2.

Fruits, seeds and chromosome number unknown.
DISTRIBUTION AND HAbITAT.-Comores; Madagascar, prov. Antsiranana; forest.
Flowering time.-March.
Material studied.-Comores: Lavanchie s.n., Anjouan, 19.X. 1905 (P).-Madagascar: Boivin s.n., Lokobe, Nossi-Bé, III. 1851 (P); s.n. (P); Keraudren 1594, Nossi-Bé, Réserve Lokobe, III. 1962 (P).

This subspecies is restricted to Nossi-Bé, an island off northwestern Madagascar and the Comores. It is still insufficiently known both ecologically and in its relationship to the typical subspecies. However, while the other non-linear leafed specimens available show no additional
characters separating them from the linear-leaved ones, subsp. keraudreniae is easily separable by its long peduncle. To re-evaluate the $C$. lineare complex, more material is urgently needed.

The taxon is named in honour of Dr. Monique Keraudren-Aymonin, the collector of the type specimen.

## Cynanchum phillipsonianum Liede \& Meve, sp. nov.

Plantae erectae, surculis succulentis, foliis ovatis vel lanceolatis, $30-50 \mathrm{~mm}$ longis, 9-15 mm latis. Inflorescentia cymosa, botrychoidea, 15-30-flora, flores 4-6 simul apertos evoluta. Corolla 3-3.5 mm long, purpurata. Corona gynostegialis alba, gynostegium altitudine aequans, partibus staminalibus interstaminalibusque per 1/2-3/4 altitudinis totae connatis. Forma partium interstaminalium solum differens, lobos erectos, cucullatos. Gynostegium stipitatum, captite stylorum elongate conico, bifurcato.

Type.-Bardot-Vaucoulon 40 (holo-, P!).
Plants erect, sparsely acrotonically branched. Subterranean organs unknown. Shoots perennial, succulent, glabrous; internodes $2-4 \mathrm{~cm}$ long, $3-4.5 \mathrm{~mm}$ diam. Pseudo-stipules absent. Leaves persistent; petiole $11-20 \mathrm{~mm}$ long; four colleters at the base of the leaves; leaf blades herbaceous, $30-50 \mathrm{~mm}$ long, $9-15 \mathrm{~mm}$ wide, ovate to ovate-lanceolate, basally slightly cordate, apically acute.

Inflorescences bostrychoid, 15-30-flowered, 4-6 flowers open at a time. Peduncles $15-30 \mathrm{~mm}$ long, glabrous; rachis $15-20 \mathrm{~mm}$ long, straight. Floral bracts $0.7-0.8 \mathrm{~mm}$ long, $0.6-0.7 \mathrm{~mm}$ wide at the base, deltoid, glabrous. Pedicels $0.3-0.5 \mathrm{~mm}$ long, glabrous. Floral buds $2.5-3.5 \mathrm{~mm}$ long, $1.3-1.7 \mathrm{~mm}$ diam., conical to ovoid, with imbricate aestivation. Calyx lobes $1.6-1.8 \mathrm{~mm}$ long, $0.8-0.9 \mathrm{~mm}$ wide, ovate, apically acute, abaxially glabrous. Corolla cyathiform, $3-3.5 \mathrm{~mm}$ long, lobes fused for more than $1 / 4$ of total corolla length, $1.1-1.3 \mathrm{~mm}$ wide, incurved, ovate, apically obtuse, abaxially purple; adaxially slightly papillose, basally purple, apically yellowish green. Gynostegial corona pale yellowish green, $2.4-2.6 \mathrm{~mm}$ high, equalling the gynostegium in height. C (is) consisting of Cs and Ci fused for about $2 / 3$ of total corona length, only Ci differentiated. Cs apically erect. Ci laminar, producing a pronounced convex fold along the upper half of corona height; lobes of Ci cucullate, erect, with laterally and apically involute margins. Gynostegium $1.4-1.6 \mathrm{~mm}$ high, $1.8-2.2 \mathrm{~mm}$ diam., atop a $0.5-0.6 \mathrm{~mm}$ long stipe. Stamens without filament; anthers about as high as broad; trapezoidal, abaxially gibbose. Anther wings $0.65-0.7 \mathrm{~mm}$ long, extending along the whole length of the anther; adjacent anther wings parallel to each other, centrifugal. Connective appendages $0.83-0.87 \mathrm{~mm}$ long, $0.6-0.65 \mathrm{~mm}$ wide, triangular, equalling the stamen in width, erect. Pollinarium: corpusculum $0.24-0.25 \mathrm{~mm}$ long, margins of the corpuscular cleft divergent towards the apex; caudicles $0.12-0.13 \mathrm{~mm}$ long, flattened, convexly recurved, trapezoidal; pollinia laterally attached to the caudicles, 0.38-0.4 mm long, 0.19-0.21 mm wide, ovate in cross-section, ovoid. Stylar head $0.9-0.95 \mathrm{~mm}$ diam., $1.15-1.2 \mathrm{~mm}$ high; upper part $0.74-0.77 \mathrm{~mm}$ high, elongated-conical and bifurcate.

Follicles one or occasionally two per flower, erect, $55-60 \mathrm{~mm}$ long, $5-6 \mathrm{~mm}$ wide, obclavate, ovate in cross-section, apex strongly beaked, grey to medium brown, smooth, glabrous. Seeds $6-6.5 \mathrm{~mm}$ long, $4-4.5 \mathrm{~mm}$ wide, ovate, medium brown, seta and aseta side with a few, irregularly


Fig. 3.-Cynanchum phillipsonianum Liede \& Meve: A, habit, with inflorescences and fruits; B, flower, two corolla lobes removed; C, gynostegium and corona (partially removed); D, pollinarium; E, stylar head; F, seed. (Bardot Vaucoulon 40 ). Drawings by U . Meve (A) and G . Hintze.
arranged trichomes, $0.35-0.4 \mathrm{~mm}$ long; wing $0.3-0.45 \mathrm{~mm}$ wide, laterally entire, apically dentate; coma $25-30 \mathrm{~mm}$ long.

Chromosome number unknown.-Fig. 3, Map 1.
DISTRIBUTION AND habitat.-Madagascar, prov. Antsiranana; Tsingy.
Flowering Time.-June, November.
Material studied.-Madagascar: Bardot-Vaucoulon 40; 210, Tsingy du Lac Vert, Ankarana du N, 3.VI. 1990 (P); Gillespie 4084, Ankarana, 7 km SE of Matsaborimanga, 29.XI. 1990 (P).

From the remainder of the broad-leaved Malagasy species, C. phillipsonianum differs most obviously by its soft, smooth stems, which are reminiscent of the genus Folotsia. The strongly

bifurcate, elongated-conical stylar head is also characteristic for this species. Corona structure suggests an affinity to the "pseudolobe-formers".

The species is named after Dr. P.B. PhilliPSON, Grahamstown, South Africa, who introduced me to the wonders of the Malagasy flora.

## LEAFLESS CYNANCHUM SPECIES

Cynanchum ansamalense Liede, sp. nov.
Ramis subsucculentibus gracilibus; lobis corollae decurvis; corona gynostegialis cyathiforme gynostegio breviore; gynostegio breve stipitato; capite stylorum breve ob-infundibuliforme.

Type.-Rauh 21850, Madagascar, prov. Toliara, 70 km from Ansamala, 4.IV. 1969 (holo-, HEID !). Only known material.

Plants ascending, twining. Subterranean organs unknown. Shoots semi-succulent, finely striate, glabrous; internodes $1-1.5 \mathrm{~mm}$ diam. Leaf scales sessile, $0.8-1 \mathrm{~mm}$ long, $0.8-1 \mathrm{~mm}$ wide, ovate, apically mucronate, glandular.

Inflorescences subsessile, bostrychoid, 1-4-flowered, 1-2 flowers open at a time. Floral bracts $0.3-0.4 \mathrm{~mm}$ long, $0.3-0.4 \mathrm{~mm}$ wide at the base, deltate, glandular over the whole surface, glabrous. Pedicels $0.2-0.4 \mathrm{~mm}$ long, glabrous. Floral buds $0.6-0.7 \mathrm{~mm}$ long, $0.5-0.6 \mathrm{~mm}$ diam., globose, with imbricate aestivation. Calyx lobes 0.3 mm long, 0.3 mm wide, triangular, apically acute, abaxially non-glandular, glabrous. Corolla rotate, $1.8-2 \mathrm{~mm}$ long; lobes basally fused; $0.8-1 \mathrm{~mm}$ wide, decurved, oblong, apically acute, basally yellow, apically purple, adaxially with dark purple along the main nerves. Gynostegial corona ivory, cyathiform, 1.1-1.2 mm high, shorter than the gynostegium. C (is) consisting of Cs and Ci completely fused, annular, Ci as long as Cs , thicker than Cs. Cs appressed to the back of the stamens, apically erect. Ci laminar, reflexed. Gynostegium $0.9-1 \mathrm{~mm}$ high, $1.4-1.5 \mathrm{~mm}$ diam., atop a stipe of $0.25-0.3 \mathrm{~mm}$ length. Stamens without filament; anthers broader than high, deltoid, abaxially planar. Anther wings $0.1-0.2 \mathrm{~mm}$ long, extending along the whole length of the anther; adjacent anther wings parallel to each other, basally widened, in the same plane as the anther, but in considerable distance from each other, not forming proper guide rails. Connective appendages $0.3-0.4 \mathrm{~mm}$ long, $0.2-0.3 \mathrm{~mm}$ wide, rectangular, almost exclusively consisting of the thickened midrib, narrower than the stamen, erect. Pollinarium: corpusculum $0.13-0.14 \mathrm{~mm}$ long, elliptic, margins of the corpuscular cleft parallel, basally widened. Caudicles 0.1 mm long, cylindrical, straight, horizontal, thickened at the insertion of the pollinium; pollinia $0.24-0.25 \mathrm{~mm}$ long, $0.11-0.12 \mathrm{~mm}$ wide, ovate in cross-section, clavate, laterally attached to the caudicles. Stylar head papillose, $0.75-0.85 \mathrm{~mm}$ diam., $0.75-$ 0.85 mm high; upper part $0.55-0.6 \mathrm{~mm}$ high, shortly ob-infundibuliform.-Fig. 4, Map 3.

Fruits, seeds and chromosome number unknown.
DISTRIBUTION AND HABITAT.-Madagascar, prov. Toliara.
Flowering time.-April.


Fig. 4.-Cynanchum ansamalense Liede: A, inflorescence, bud and flower; B, gynostegium and corona, partially removed; C, corona adaxially, showing the slight thickening and the folds pressing against the anther; $\mathbf{D}$, pollinarium; $\mathbf{E}$, stylar head. (Rauh 21850). Drawings by Jim Conrad.

Among the leafless Malagasy Cynanchum species, C. ansamalense is the only one possessing a truly annular corona. The ridges on the adaxial surface of the corona is reminiscent of the equally leafless $C$. gerrardii and the leafy African species $C$. schistoglossum. The characteristic shortly ob-infundibuliform stylar head further distinguishes this species.

Cynanchum appendiculatopsis Liede, sp. nov.

Structura floris C. appendiculato similaris, sed differt habitu aphyllo, gynostegio breviter stipitato, capite stylorum valde bifido.

Type.-Bosser 16816 (holo-, P!).
Plants erect to decumbent, $40-50 \mathrm{~cm}$ high, sparsely branched from the base, sarmentose, with adventitious roots restricted to the nodes. Subterranean organs consisting of fibrous roots. Shoots semi-succulent, with flattened nodes, finely striate, obscurely glaucous, sparsely glabrescent with flexuous trichomes, $0.3-0.4 \mathrm{~mm}$ long; internodes $3.5-6 \mathrm{~cm}$ long, $1.5-2 \mathrm{~mm}$ diam. Leaf scales papery, $1-1.2 \mathrm{~mm}$ long, $0.6-0.8 \mathrm{~mm}$ wide, ovate, apically acute to acuminate. Latex ivory.

Inflorescences subsessile, sciadioidal, 2-5-flowered, 2-3 flowers open at a time. Floral bracts $0.6-0.7 \mathrm{~mm}$ long, $0.7-0.8 \mathrm{~mm}$ wide at the base, triangular, glabrous. Pedicels $2-4 \mathrm{~mm}$ long, sparsely covered with flexuous trichomes, $0.15-0.25 \mathrm{~mm}$ long. Floral buds $3-3.5 \mathrm{~mm}$ long, $1.3-$ 1.5 mm diam., conical, with imbricate aestivation. Calyx lobes 1-1.2 mm long, $0.5-0.6 \mathrm{~mm}$ wide, ovate, apically acute, abaxially glabrous. Corolla campanulate, $2.5-3.5 \mathrm{~mm}$ long; lobes basally fused, $0.8-1 \mathrm{~mm}$ wide, incurved to patent, oblong, apically acute, rose with purple along the main nerves. Gynostegial corona green, cyathiform, $1.0-1.2 \mathrm{~mm}$ high, slightly shorter than the gynostegium. C (is) consisting of Cs and Ci fused for more than $3 / 4$ of total corona length, Cs and Ci differentiated. Cs not appressed to the back of the stamens, apically erect to reflexed; lobes of Cs laminar, ovate, with straight margins. Ci laminar, producing a convex fold. Gynostegium $0.85-0.9 \mathrm{~mm}$ high, $1.1-1.2 \mathrm{~mm}$ diam., atop a stipe of 0.5 mm . Stamens without filament. Anthers broader than high, rectangular, abaxially planar. Anther wings $0.4-0.45 \mathrm{~mm}$ long, extending along the whole length of the anther; adjacent anther wings parallel to each other, in the same plane as the anther. Connective appendages $0.3-0.35 \mathrm{~mm}$ long, $0.35-0.4 \mathrm{~mm}$ wide, widely ovate, narrower than the stamen, slightly inflexed. Pollinarium: corpusculum $0.175-$ 0.2 mm long; caudicles $0.12-0.15 \mathrm{~mm}$ long; caudicles medianly inserted at the corpusculum, flattened, straight, declinate, triangular; pollinia $0.25-0.28 \mathrm{~mm}$ long, $0.15-0.17 \mathrm{~mm}$ wide, ovate in cross-section, ovoid, laterally attached to the caudicles. Stylar head $0.9-1 \mathrm{~mm}$ diam., 0.75 0.85 mm high; upper part $0.6-0.65 \mathrm{~mm}$ high, bifurcate.

Follicles one per flower, erect, 55 mm long, 3 mm wide, obclavate to narrowly oblong, round in cross-section, apex strongly beaked, light brown, longitudinally grooved, glabrous.-Fig. 5, Map 3.

Seeds and chromosome number unknown.
DISTRIBUTION AND habitat.-Madagascar, prov. Fianarantsoa; granitic rocks.


Fig. 5.-Cynanchum appendiculatopsis Liede: A, shoot with rhizome, inflorescence and fruit; B, flower, two corolla lobes removed; C, gynostegium, corona partially removed; D, pollinarium; E, stylar head. (Bosser 16816). Drawings by Jim Conrad.

FLOWERING TIME.-April.
Material studied.-Madagascar: Bosser 19590, Itremo, 1964; 16816, route du Sud, P.K. 300, IV. 1963 (P).

The species is easily identified by its enormous, strongly bifurcate stylar head. This stylar head, and the floral structure as a whole is reminiscent of the shrubby C. appendiculatum. The striate shoots in combination with ivory latex suggest that it is probably a member of the C. gerrardii group.

## Cynanchum luteifluens (Jum. \& H. Perrier) Desc.

Adansonia, sér. 2, 1: 314 (1961).
Decanema luteifluens Jum. \& H. Perrier, Rev. Gén. Bot. 23: 253 (1911), Compt. Rend. Hebd. Séances Acad. Sci. 152: 1017 (1911).

Type.-Bojer s.n. (holo-, P!).
Plants twining, 2-3 m high, richly, irregularly branched. Subterranean organs consisting of fibrous roots. Shoots semi-succulent, basally woody, with grayish bark, finely, but conspicuously striate, obscurely glaucous, glabrous (but often covered with a blackish fungus). Latex yellow.

Calyx lobes entirely free, ovate, apically acute, ciliate. Corolla rotate; lobes basally fused. Gynostegial corona white, urceolate, exceeding the gynostegium and partly obscuring it. C(is) consisting of Cs and Ci fused for more than $1 / 4$ of total corona length, abaxially glabrous, Cs and Ci differentiated, Ci thinner than Cs . Cs appressed to the back of the stamens, adaxially with a basal protuberance corresponding to the filament. Gynostegium sessile. Anther wings extending along the whole length of the anther, distal ridge smooth.

Follicles normally one per flower, erect, narrowly oblong, round in cross-section, apically obtuse, light greenish brown, longitudinally grooved, glabrous. Seeds pyriform, medium brown, seta and aseta side with regularly arranged trichomes, $0.25-0.3 \mathrm{~mm}$ long, margins wingless, denticulate; coma $20-25 \mathrm{~mm}$ long.
C. luteifluens represents the most frequent leafless Cynanchum species in Madagascar. While floral size is fairly variable, there is a distinct gap separating the largest flowers. Their recognition as a distinct variety seems therefore warranted. The large-flowered variety is encountered mainly on the Central Plateau, the Isalo, and around Fort Dauphin, while the typical variety occurs there and, in addition, in the arid south and the northwest.

## Cynanchum luteifluens (Jum. \& H. Perrier) Desc. var. Iuteifluens

Decanema bojerianum Decne., Ann. Sci. Nat. Bot. 9: 338, pl. 12, Fig. G (1838) (as "bojeriana"), non
C. bojerianum (Decne.) Choux (1931); C. decaisnianum Desc., Adansonia, sér. 2, 1:314 (1961), non C. decaisneanum R.W. Holm (1953), nor C. decaisneanum Alain (1955) (Art 53.3, IBCN).

Sarcostemma mauritianum Bojer, Hort. Maurit.: 214 (1837), non C. mauritianum Lam. (1786), nor C. mauritianum Bojer ex Decne. (1844).

Asclepias aphylla Bojer, nom. in sched. (P); A. aphylla Bojer ex Decne. in DC., Prodr. 8: 546 (1844), pro syn., non A. aphylla Forssk. (1775), nor A. aphyllum Thunb. (1794), nor A. aphyllum Roxb. ex Wight (1837).

Internodes 4-12 cm long, 2-3 mm diam. Leaf scales sessile, $1.2-1.5 \mathrm{~mm}$ long, $0.8-1 \mathrm{~mm}$ wide, broadly ovate, apically acute.

Inflorescences sessile, sciadioidal, 1-4-flowered, all flowers open at a time. Floral bracts 0.40.8 mm long, $0.3-0.5 \mathrm{~mm}$ wide at the base, ciliate. Pedicels $3.5-5 \mathrm{~mm}$ long, isolatedly to densely covered with uncinate trichomes, $0.15-0.2 \mathrm{~mm}$ long. Floral buds $2-2.5 \mathrm{~mm}$ long, $1.2-1.6 \mathrm{~mm}$ diam., conical, with imbricate, apically slightly contorted aestivation. Calyx lobes $0.6-0.8 \mathrm{~mm}$ long, $0.4-0.6 \mathrm{~mm}$ wide. Corolla $1.5-3 \mathrm{~mm}$ long; lobes $0.7-1 \mathrm{~mm}$ wide, patent, oblong, apically obtuse, yellow. Gynostegial corona $2-3(-3.5) \mathrm{mm}$ high, Ci slightly longer than Cs , thinner than Cs. Lobes of Cs apically erect to strongly inflexed; extending into a long twisted filament, with straight margins. Lobes of Ci erect to reflexed, extending into a long twisted filament. Gynostegium 1-1.5 mm high, $1-1.2 \mathrm{~mm}$ diam. Stamens with filament of $0.25-0.3 \mathrm{~mm}$ height; anthers broader than high; rectangular, abaxially planar. Anther wings $0.3-0.4 \mathrm{~mm}$ long; adjacent anther wings parallel to each other, in the same plane as the anther. Connective appendages $0.4-0.5 \mathrm{~mm}$ long, $0.4-0.5 \mathrm{~mm}$ wide, widely ovate, equalling the stamen in width, slightly inflexed. Pollinarium: corpusculum $0.15-0.18 \mathrm{~mm}$ long, margins of the corpuscular cleft parallel, basally widened; caudicles 0.06-0.075 mm long, flattened, straight, horizontal, triangular; pollinia $0.175-0.225 \mathrm{~mm}$ long, $0.1-0.125 \mathrm{~mm}$ wide, ovate in cross-section, ovoid, laterally attached to the caudicles. Stylar head white, $0.8-1 \mathrm{~mm}$ diam., $0.5-0.6 \mathrm{~mm}$ high; upper part $0.4-0.5 \mathrm{~mm}$ high, depressed-conical or umbonate.

Follicles $80-180 \mathrm{~mm}$ long, $4-5 \mathrm{~mm}$ wide. Seeds $3.5-5 \mathrm{~mm}$ long, $1.5-2 \mathrm{~mm}$ wide.-Fig. 6 , Map 4.

Chromosome Number: $2 \mathrm{n}=22$ (Liede \& Conrad 2752, 2673).

DISTRIBUTION AND HABITAT.-Madagascar, in all drier parts of the island, absent in the far North and along the East coast; Ile Europe; $0-1400 \mathrm{~m}$; gneiss rocks, dunes, xerophytic bush.

Flowering time.-All year, with peak between February and May.

Vernacular names.-Sanatry, Sanizaza (Androy), Tina, Trihy, Try,
Literature and illustrations.-Decaisne M.J., Ann. Sci. Nat. Bot., sér. 2, 9: tab. 12 (1838), illustration of flower, corona, anther, pollinarium and stylar head; DELESSERT B., Icones Selectae Plantarum, vol. 5, tab. 68 (1846).

There are some specimens (e.g., Rabevohitra 1868 , MO) that display extremely small flowers. However, as their basic floral structure is that of $C$. luteifluens, and because material is too scarce to determine whether they constitute occasional aberrations or taxonomically recognizable entities, they are included in C. Iuteifluens var. luteifluens here.


Fig. 6.-Cynanchum luteifluens Desc.: A, A', inflorescence and flower; B, B', gynostegium, corona partly removed; C, $\mathbf{C}^{\prime}$, pollinaria; D, stylar head; E, fruit; F, seed. A-C, var. luteifluens (Liede \& Conrad 2731); A'-D, var. longicoronae (Liede \& Conrad 2624); E, var. luteifluens (Perrier de la Bâthie 16798); F, var. luteifluens (Liede \& Conrad 2703). Drawings by Jim Conrad.

Cynanchum luteifluens Desc. var. longicoronae Liede, var. nov.
Varietas typica affine, sed floribus grandioribus; lobis corollae et coronis 4.5 mm longis vel longior; elongatis apicibus partium staminalium interstaminaliumque corona nunquam inflexis.

Type.-Keraudren 306 (holo-, P!).
Internodes $4-10 \mathrm{~cm}$ long, $2.5-4 \mathrm{~mm}$ diam. (at least terminal branches thicker than in typical variety). Latex yellow. Leaf scales sessile, $1.5-2 \mathrm{~mm}$ long, $1.4-1.6 \mathrm{~mm}$ wide, broadly ovate, apically acuminate.

Inflorescences subsessile, sciadioidal, 2-7-flowered, 1-5 flowers open at a time. Floral bracts $0.8-1.2 \mathrm{~mm}$ long, $0.4-0.6 \mathrm{~mm}$ wide at the base, triangular, with trichomes. Pedicels $4-6 \mathrm{~mm}$ long, sparsely covered with flexuous trichomes, $0.15-0.2 \mathrm{~mm}$ long. Floral buds $4-4.5 \mathrm{~mm}$ long, 22.5 mm diam., conical, with imbricate to apically slightly contorted aestivation. Calyx lobes 1 1.2 mm long, $0.8-1 \mathrm{~mm}$ wide. Corolla $4.5-6 \mathrm{~mm}$ long; lobes $1.2-2 \mathrm{~mm}$ wide, decurved, oblong, apically acute to obtuse, twisted, greenish yellow to brown, frequently with brown along the main nerves. Gynostegial corona $4.5-6.5 \mathrm{~mm}$ high, Ci distinctly longer than Cs. Lobes of Cs erect, extending into a filament. Lobes of Ci reflexed, extending into a filament. Gynostegium $2.5-3.5 \mathrm{~mm}$ high, $1.5-2 \mathrm{~mm}$ diam. Stamens with filament of $0.6-0.8 \mathrm{~mm}$ height; anthers about as high as broad, trapezoidal, abaxially planar. Anther wings, $0.8-1.2 \mathrm{~mm}$ long, extending along the whole length of the anther, distal ridge smooth; adjacent anther wings parallel to each other, basally widened, slightly centrifugal, basally forming a distinct "mouth". Connective appendages $1-1.2 \mathrm{~mm}$ long, $0.8-1 \mathrm{~mm}$ wide, ovate, equalling the stamen in width, strongly inflexed. Pollinarium: corpusculum $0.3-0.4 \mathrm{~mm}$ long, margins of the corpuscular cleft parallel, basally widened; caudicles $0.13-0.16 \mathrm{~mm}$ long, flattened, straight, declinate; pollinia 0.3-0.4 mm long, $0.15-0.2 \mathrm{~mm}$ wide, ovate in cross-section, ovoid, laterally attached to the caudicles. Stylar head white, 1.21.5 mm diam., $1.5-1.7 \mathrm{~mm}$ high; upper part $0.75-0.85 \mathrm{~mm}$ high, conical and bifurcate.

Follicles $90-140 \mathrm{~mm}$ long, $6-8 \mathrm{~mm}$ wide, narrowly oblong, round in cross-section, apically obtuse, light greenish brown, longitudinally grooved, glabrous. Seeds $4.5-5.5 \mathrm{~mm}$ long, 2-2.5 mm wide, pyriform, medium brown, seta and aseta side with regularly arranged trichomes, $0.2-0.3 \mathrm{~mm}$ long; marginally wingless, denticulate; coma $20-25 \mathrm{~mm}$ long.-Fig. 6, Map 4.

Chromosome number unknown.
Distribution and habitat.-Madagascar, prov. Fianarantsoa, Toliara-Ambovombe, Bekily, Tôlanaro, Ranohira, Toliara; 150-1800 m; granitic rocks; margins of bush and forest patches.

Flowering time.-All year with peak between November and March.
Literature and illustrations.-Choux M.P. (1914): 291-298; Descoings B. (1961): 313, with illustrations of flower, corona, anther, pollinarium; Jumelle H. \& Perrier de la Bâthie H., Ann. Inst. Bot.-Géol. Colon. Marseille, sér. 2, 9: 195 (1908).

Material studied.-Madagascar: D'Arcy \& Rakotozafy 15347, between Ambovombe and Fort Dauphin, 9. V. 1983 (MO); Bosser 9174, Ihosy, P.K. 596, II. 1956 (P); 15725, Vohitany, Bekily, II. 1962 (P); Cours 5086, Isalo, Sahanafo, 31.I. $1955(\mathrm{P})$; 5125, rocher de Bemanda, route de la haute vallée d'Ihosy vers le km 25, 4.II. 1955 (P); Croat 30296, W of Ambalavao, near P.K. 475, on and around base of inselbergs, $950-1050 \mathrm{~m}$, 1.II. $1975(\mathrm{MO}) ; 30566,10 \mathrm{~km} \mathrm{~W}$ of Ranohira on route \#7, massif de l'Isalo, $810 \mathrm{~m}, 3 . \mathrm{II} .1975$ (MO); 32061, between Beraketa and Isoanala, along Route \#13, 250-660 m, 22.II. 1975 (MO); Decary 717, Ankatso (Antananarivo), 20.II. 1921 (P); 3826, Antanimora, 13.V. 1929 (P, TAN); 4553, Antanimora, prov. de Fort Dauphin, 30.VII. 1926 (P); 5497, chaîne d'Ambinda à l'ouest d'Ivohibe, 1200-1300 m, 26.IX. 1926 (P); 6253, Anosivato (environs de Tananarive), 22.IV. 1928 (P); 9011, Tranomaro, au NE d'Ambovombe, 19.VI. 1931 (P); 13212, Ambatofinandrahanana (environs de), 1600-1800 m, 22.II. 1938 (P); Descoings 1002, au S de Betroka, route Antanimora-Betroka (P); 2200, à l'est d'Ihosy, plaine de la Menarahaka, 1.II. 1957 (P); 3617, Ihosy, Station I - rochers au-dessus de l'aérodrome, 10.VII. $1958(\mathrm{P}) ; 3645$, route d'Ivohibe, km 12 , à droite de la plaque et escarpement du rocher, 12.VII. 1958 (P); Humbert 12810, vallée de Manambolo, rive gauche (bassin du Mandrare), environs d'Isomono, confluent de Sakamalio, 400-600 m, XII. 1933 (P); 12964, vallée de Manambolo, rive droite, bassin de Mandrare, environs d'Isomono, confluent de Sakamalio, 400-900 m, XII. 1933 $(\mathrm{P}) ; 28549$, haute vallée de Menarahaka, à l'est d'Ihosy, $700-800 \mathrm{~m}, 1955(\mathrm{P})$; Humbert \& Perrier de la Bâthie 2536, environs de Tuléar, 10-200 m, IX. 1924 (B, P); Keraudren 306, 317 avant le village de Zazafotsy, entre Ambalavao et Ihosy, III. 1960 (P); Liede \& Conrad 2624, route Antsirabé - Fianarantsoa, 16 km S of Ambalavao, ca. $1300 \mathrm{~m}, 30 . \mathrm{I} .1990$ (MO, P, TAN); 2776, River crossing road to Andohahela, 9 km from turnoff, along river ca. 500 m downstream, ca. 300 m , 19.II. 1990 (MO, P, TAN); 2849, first bridge N of Ihosy, ca. $700 \mathrm{~m}, 27 . \mathrm{II} .1990$ (MO, P, TAN); Miller \& Radrianasolo $6224,6242,12 \mathrm{~km} \mathrm{~S}$ of Ihosy on route nationale 7 , on the N edge of the Horombe plateau, 800 m , 1.IV. 1991 (MO, P); Paroisse 29, Tsilamaha, 100 km à l'ouest de Fort Dauphin, 1897 (P); Peltier \& Peltier 2754, km 4 route d'Ihosy à Farafangana, 11.II. $1961(\mathrm{P}) ; 4841 \mathrm{~km} 60$, route nationale 27 , d'Ihosy à Ivohibe, 23.II. 1964 (P); Perrier de la Bâthie 12465, Itremo, ca. $1200 \mathrm{~m}, 1919$ (P); Phillipson 2545, Beza Mahafaly Reserve, near Betioky, hills E of Sakamena, S of Ambinda, 160 m, 13.XI. 1987 (MO, P); Seyrig 340, Ampandrandava, 700-1000 m, III. 1943 (P); Waterlot 46, Ankatso, III. 1921 (P); 651, Antananarivo, XI. 1922 (P).

For both varieties it is characteristic that the $C$ (is) part of the corona accounts for roughly half of total corona length. In both varieties, Ci , fairly constantly, is approximately of the same length as the $\mathrm{C}($ is ); while Cs is highly variable, occasionally only forming teeth.

CHOUX (1914), who claims to have seen the whole variability of C. luteifluens seems to have studied only var. longicoronae because the total corona length of his smallest flower is 5.3 mm .

## Cynanchum mevei Liede, sp. nov.

Scandens, ramis succulentibus; floribus sulfureibus, corollis campanulatis; partibus staminalibus interstaminalibusque coronae gynostegialis late connatis, partibus staminalibus longe filiformibus reflexis, partibus interstaminalibus valde carinatis.

TYPE.-Liede \& Conrad 2780 (holo-, MO !; iso-, TAN, MSUN, in spiritu).
Plants twining, $80-150 \mathrm{~cm}$ high, richly branched. Subterranean organs consisting of fibrous roots and several nodiform tubers. Shoots semi-succulent, finely striate, obscurely glaucous, sparsely glabrescent with appressed trichomes, 0.3-0.4 mm long; internodes 3-7 cm long, 1-2 mm


Fig. 7.-Cynanchum mevei Liede: A, stems with inflorescences; $\mathbf{B}$, flower in top view; $\mathbf{C}$, corona; $\mathbf{D}$, gynostegium; $\mathbf{E}$, stylar head with pollinaria; F, pollinarium. Drawings by U. Meve.
diam. Leaf scales sessile, fleshy, 2-2.5 mm long, $0.5-0.7 \mathrm{~mm}$ wide, lanceolate, apically acute. Latex ivory.

Inflorescences sessile to pedunculate, sciadioidal, 1-3-flowered, all flowers open at a time. Peduncles $0-2 \mathrm{~mm}$ long, sparsely covered with appressed trichomes, $0.3-0.4 \mathrm{~mm}$ long. Floral bracts 0.8 mm long, 0.8 mm wide at the base, triangular, glabrous. Pedicels $1-2.5 \mathrm{~mm}$ long, isolatedly covered with appressed trichomes, $0.25-0.3 \mathrm{~mm}$ long. Floral buds $3.5-4 \mathrm{~mm}$ long, $3.5-4 \mathrm{~mm}$ diam., conical, with imbricate aestivation. Calyx fused for more than $1 / 2$ of its length; campanulate, abaxially glabrous; lobes $0.3-0.4 \mathrm{~mm}$ long, $0.5-0.6 \mathrm{~mm}$ wide, triangular, apically acute. Corolla urceolate, $4.5-$ 5.5 mm long; lobes fused for more than $1 / 4$ of total corolla length, $2-2.5 \mathrm{~mm}$ wide, forming bulges at their sinuses, incurved, apically recurved, triangular, keeled, apically acute, yellowish green. Gynostegial corona yellow, $2-2.5 \mathrm{~mm}$ high, equalling the gynostegium in height, vertically articulated. Lower portion reaching less than $1 / 3$ of entire corona length, bowl-shaped, smaller in diameter than upper portion, without particular separating structures. C (is) consisting of Cs and Ci fused for more than $3 / 4$ of total corona length (not taking into account the long, filiform appendages of Cs), Cs and Ci differentiated, Ci shorter than Cs . Cs adnate to the back of the stamens for about $1 / 3$ of anther height, appressed to the back of the stamens; lobes of Cs laminar, extending into a long, filiform appendage strongly bent backward to assume a patent position. Ci laminar, strongly keeled along the upper two thirds of corona length, erect. Gynostegium 2-2.5 mm high, 2-2.2 mm diam., sessile. Stamens with filament of $0.3-0.4 \mathrm{~mm}$ height; anthers higher than broad; rectangular, abaxially planar to convex. Anther wings parallel to each other, $1-1.2 \mathrm{~mm}$ long, extending along the whole length of the anther, distal ridge smooth; adjacent anther wings parallel to each other, in the same plane as the anther. Connective appendages $0.85-1 \mathrm{~mm}$ long, $0.75-0.85 \mathrm{~mm}$ wide, widely ovate, broader than the stamen, slightly inflexed. Pollinarium: corpusculum $0.25-0.3 \mathrm{~mm}$ long, margins of the corpuscular cleft parallel, basally widened; caudicles $0.15-0.18 \mathrm{~mm}$ long, flattened, straight, horizontal, trapezoidal; pollinia $0.3-0.35 \mathrm{~mm}$ long, $0.14-0.16 \mathrm{~mm}$ wide, ovate in cross-section, ovoid, laterally attached to the caudicles. Stylar head $1.2-1.4 \mathrm{~mm}$ diam., $1.3-1.5 \mathrm{~mm}$ high; upper part $0.7-$ 0.75 mm high, conical.

Follicles erect, ca. 75 mm long, 8 mm diam., obclavate, sharply deltate in cross-section, apex obtuse, greenish-brown. Seeds $2.4-2.6 \mathrm{~mm}$ long, $1.4-1.6 \mathrm{~mm}$ diam., pyriform, medium brown, seta and aseta side papillose with regularly arranged papillae and $0.1-0.2 \mathrm{~mm}$ long trichomes, margins wingless; coma ca. 10 mm long.

Chromosome number: $2 \mathrm{n}=22$ (Liede \& Conrad 2780).-Fig. 7, Map 3.
DISTRIBUTION AND habitat.-Madagascar, prov. Toliara; ca. 200 m ; in scrub.
Flowering Time.-February.
Material Studied.-Madagascar: Liede \& Conrad 2780, prov. Toliara-Ambovombe, road from Amboasary to Ambovombe, 24 km before Ambovombe, hills to the right of the road, 200 m , 20.II. 1990 (MO, TAN); Teissier 211, W of Amboasary, XI. 1994 (Les Cèdres).

This attractive and freely flowering species is unmistakable among the leafless members of Cynanchum by its urceolate corona and the long filiform appendages of Cs, which are bent backwards to assume a patent position. Seen from the the top, the flower displays a star-shaped
appearance. The relationships of C. mevei lie with the C. ampanihense group of species. The species is named for Dr. Ulrich Meve, Münster, the enthusiastic Asclepiadaceae student who has for many years taken care of my asclepiad collection.

## Cynanchum nematostemma Liede, nom. nov.

Nematostemma perrieri Choux, Compt. Rend. Hebd. Séances Acad. Sci. 172: 1310 (1921), non Cynanchum perrieri Choux, Ann. Inst. Bot.-Géol. Colon. Marseille, sér. 3, 2: 307, 1914.

Type.-Perrier de la Bâthie 13227, Madagascar, Ankarafantsika (Boina), 7.IX. 1920 (holo-, P!). Only material known.

Plants erect, saltatoric, non-twining, $30-60 \mathrm{~cm}$ high, richly branched from the base. Subterranean organs consisting of fibrous roots. Shoots semi-succulent, not warty, finely striate, not glaucous, glabrous; internodes 4-12 cm long, $1.5-2 \mathrm{~mm}$ diam. Leaf scales caducous, sessile, $0.8-$ 1 mm long, $0.3-0.4 \mathrm{~mm}$ wide, triangular, apically acute, glabrous.

Inflorescences subsessile, sciadioidal, 5-7-flowered, 1-2 flowers open at a time. Floral bracts 0.75 mm long, 0.75 mm wide at the base, triangular, glabrous. Pedicels $2-5 \mathrm{~mm}$ long, glabrous. Floral buds $5-7 \mathrm{~mm}$ long, 2 mm diam., elongate-conical, with imbricate aestivation. Calyx lobes 1 mm long, 0.8 mm wide, ovate, apically acute, abaxially glabrous. Corolla campanulate, $5-7 \mathrm{~mm}$ long; lobes fused for about $1 / 3$ of total corolla length, $1.2-1.6 \mathrm{~mm}$ wide, straight, patent, oblong, apically obtuse, white with purple along the main nerves and in the centre. Gynostegial corona green (fide PERRIER), $4-4.5 \mathrm{~mm}$ high, exceeding the gynostegium but not obscuring it. C(is) consisting of Cs and Ci only basally fused, only Cs differentiated. Cs connate to the filament, not appressed to the back of the stamens, lobes basally triangular, apically filamentous, erect, not twisted. Gynostegium $1.2-1.4 \mathrm{~mm}$ high, $1.2-1.3 \mathrm{~mm}$ diam., sessile. Stamens with filament 0.5 mm high; anthers broader than high, pentagonal, abaxially convex to gibbose. Anther wings $0.3-0.35 \mathrm{~mm}$ long, not extending along the whole length of the anther, the anther forming a "pseudostipe" of 0.1-0.15 mm height; adjacent anther wings parallel to each other, in the same plane as the anther. Connective appendages $0.35-0.4 \mathrm{~mm}$ long, $0.5-0.55 \mathrm{~mm}$ wide, obcordate, slightly narrower than the stamen, strongly inflexed. Pollinarium: corpusculum $0.125-0.15 \mathrm{~mm}$ long, ovoid; caudicles $0.15-0.2 \mathrm{~mm}$ long, flattened, concavely recurved, trapezioidal; pollinia subapically attached to the caudicles, $0.3-0.35 \mathrm{~mm}$ long, $0.17-0.2 \mathrm{~mm}$ wide, ovate in cross-section, ovoid. Stylar head $1.2-1.3 \mathrm{~mm}$ diam., $0.75-0.8 \mathrm{~mm}$ high; upper part $0.45-0.55 \mathrm{~mm}$ high, depressed-conical.

Follicles $55-60 \mathrm{~mm}$ long, $5-7 \mathrm{~mm}$ diam., obclavate, round in cross-section, apically strongly beaked, dark brown to black, longitudinally grooved, glabrous.-Fig. 8, Map 3.

Seeds and chromosome number unknown.
DISTRIBUTION AND habitat.-Madagascar, prov. Mahajanga; open dry sands.


Fig. 8.-Cynanchum nematostemma Liede: A, habit; B, inflorescence and flower; C, corona; $\mathbf{D}$, gynostegium; $\mathbf{E}$, pollinarium; F, stylar head; G, fruit. Perrier de la Bâthie 13227. Drawings by Jim Conrad.


Flowering time: September.
While Choux had observed the short interstaminal corona parts, his interpretation that they should be neglected because of their small size is not followed here. The basic structure of the corona ressembles closely the one of C. compactum Choux, only with the Ci slightly shorter. The monotypic genus Nematostemma Choux, therefore, cannot be maintained. Apart from similarities in corona structure, C. nematostemma shares with C. compactum the erect habit and the lack of indumentum. It differs by larger flowers, the longer staminal corona parts, the elevated guide rails and the shape of the stylar head.

Cynanchum petignatii Liede \& Rauh, sp. nov.
C. luteifluens structurae coronae, C. mahafalense structurae gynostegii stipitati similaris, sed differt a C. mahafalense lobis corollae glabris.

Type.-Decary 9011 (holo-, P !).
Plants ascending, richly, at least basally dichasially, branched. Shoots perennial, semi-succulent, basally woody, with greyish bark, with conspicuously flattened nodes, roughly warty, finely striate, prominently glaucous, glabrescent or glabrous, blue-green; internodes $4.5-10 \mathrm{~cm}$ long, 2-3.5 mm diam. Leaf scales caducous, sessile, $1.2-1.4 \mathrm{~mm}$ long, $1-1.2 \mathrm{~mm}$ wide, triangular, apically acute.

Inflorescences subsessile, sciadioidal, 2-5-flowered, 1-3 flowers open at a time. Floral bracts $0.5-0.6 \mathrm{~mm}$ long, $0.5-0.6 \mathrm{~mm}$ wide at the base, triangular, glabrous. Pedicels $2-3 \mathrm{~mm}$ long, glabrous. Floral buds $4-4.5 \mathrm{~mm}$ long, $2-2.5 \mathrm{~mm}$ diam., cylindrical, with imbricate aestivation. Calyx lobes $1.5-1.6 \mathrm{~mm}$ long, $0.8-0.9 \mathrm{~mm}$ wide, triangular-deltate, apically acute. Corolla cyathiform, $7.5-8 \mathrm{~mm}$ long; lobes basally fused, 2.5 mm wide, incurved, ovate, apically acute, with revolute margins, greenish white. Gynostegial corona cyathiform, abaxially glabrous, $5-5.5 \mathrm{~mm}$ high, exceeding the gynostegium, partly obscuring it. C (is) consisting of Cs and Ci fused for more than $1 / 4$ of total corona length, Cs and Ci differentiated, Ci longer than Cs. Cs connate to the filament for more than $1 / 3$ of corona length; lobes of Cs laminar, triangular, apically erect. Lobes of Ci laminar, elongate-triangular, producing a pronounced convex fold along the upper two thirds of corona length resulting in a cochleariform shape, erect. Gynostegium 0.60.7 mm high, $2.4-2.6 \mathrm{~mm}$ diam., atop a stipe of $2.7-3 \mathrm{~mm}$ length. Stamens without filament; anthers broader than high, deltate, abaxially convex; anther wings 0.5 mm long, extending along the whole length of the anther; adjacent another wings divergent towards the base, centrifugal. Connective appendages $0.1-0.15 \mathrm{~mm}$ long, $0.25-0.28 \mathrm{~mm}$ wide, ovate, narrower than the stamen, strongly inflexed. Pollinarium: corpusculum 0.25 mm long, ovoid; caudicles 0.5 mm long, cylindrical, straight, horizontal, thickened at the insertion of the pollinium; pollinia subapically attached to the caudicles, $0.5-0.55 \mathrm{~mm}$ long, 0.2 mm wide, oblongoid. Stylar head $1.5-1.6 \mathrm{~mm}$ diam., $0.3-0.4 \mathrm{~mm}$ high; upper part $0.1-0.15 \mathrm{~mm}$ high, umbonate.-Fig. 9, Map 3.

Fruits and seeds unknown.
Chromosome number: $2 \mathrm{n}=22$ (Teissier 262).
DISTRIBUTION AND habitat.-Madagascar, prov. Toliara; on gneiss.
Flowering time.-June.
Material studied.-Madagascar: Decary 9011, Tranomaro, au NE d'Ambovombe (P); Petignat $20 a$ (MSUN, in spiritu); Teissier 262, Tuléar, S de la Table, XI. 1994 (MSUN, in spiritu).

At first sight, this species looks like a hybrid between C. luteifluens var. longicoronae and C. mahafalense, with its cyathiform corona and the elongate-triangular lobes of Cs and Ci on the one hand and the stipitate gynostegium with the highly adnate Cs on the other. As the species


Fig. 9.-Cynanchum petignatii Liede \& Rauh: A, shoot with inflorescence (Decary 9011); B, flower, two petals removed; C, corona, adaxially, showing the smaller staminal lobe with the folds pressing against the back of the anther, and the interstaminal lobe; D, gynostegium and corona, partially removed; E, pollinarium; F, stylar head. (Petignat 20a). Drawings by Jim Conrad.
was found more than once and as there is no proof of its hybrid nature, the taxon is described as C. petignatii, honoring Herman Petignat of Tuléar, who grows this and other rare and endangered species close to their vulnerable habitat in the protection of his garden.

## Neotypification of Cynanchum radiatum Jum. \& H. Perrier

Rev. Gén. Bot. 23: 259 (1911), Compt. Rend. Hebd. Séances Acad. Sci. 152: 1016 (1911).
TYPE.-Liede, Conrad \& Barad 2744 (neo-, P!; isoneo-, TAN).
Plants twining, richly branched above. Subterranean organs unknown. Shoots semi-succulent, finely striate, obscurely glaucous, glabrescent; internodes $3-4 \mathrm{~mm}$ diam. Leaf scales sessile, fleshy, $0.8-1 \mathrm{~mm}$ long, $0.5-0.7 \mathrm{~mm}$ wide, ovate-lanceolate, apically acuminate.

Inflorescences sessile, sciadioidal, 4-5-flowered, 2-3 flowers open at a time. Floral bracts 0.5 0.6 mm long, $0.2-0.3 \mathrm{~mm}$ wide at the base, triangular, glandular over the whole surface, glabrous. Pedicels $2-3 \mathrm{~mm}$ long, glabrous. Floral buds 3-3.5 mm long, $2.5-3 \mathrm{~mm}$ diam., cylindrical, strongly pentagonal, with imbricate aestivation. Calyx fused for more than $1 / 4$ of its length, campanulate, abaxially glabrous; lobes $1-1.2 \mathrm{~mm}$ long, $1-1.2 \mathrm{~mm}$ wide, ovate, apically acute. Corolla rotate to cyathiform, $3.5-4 \mathrm{~mm}$ long; lobes fused for more than $1 / 4$ of total corolla length, $1.2-1.5 \mathrm{~mm}$ wide, incurved to patent, cucullate, apically acuminate, purple to blackish-green. Gynostegial corona white, urceolate, $2-2.5 \mathrm{~mm}$ high, exceeding the gynostegium and partly obscuring it, vertically articulated. Lower portion less than $1 / 3$ of entire corona length, cylindrical, smaller in diameter than upper portion, separated from upper portion by a marked constriction. C (is) consisting of Cs and Ci fused for more than $3 / 4$ of total corona length, Cs and Ci differentiated, Ci shorter than Cs. Cs adnate to the filament only, appressed to the back of the stamens, apically inflexed, lobes of Cs laminar, oblong. Ci laminar, trifid when flattened (with central lobe triangular and smaller than the ovate lateral lobes), strongly keeled along the upper two thirds of corona length resulting in a cucullate shape, erect, apically inflexed, with entire margins (but with a pronounced tip at the keel). Gynostegium 2.5-3 mm high, 1.8-2 mm diam., sessile. Stamens with filament of $0.75-1 \mathrm{~mm}$ height; anthers about as high as broad, rectangular, abaxially planar. Anther wings $0.8-1 \mathrm{~mm}$ long, extending beyond the anther proper; adjacent anther wings parallel to each other, basally widened, in the same plane as the anther. Connective appendages 0.6 0.7 mm long, $1-1.2 \mathrm{~mm}$ wide, depressed ovate, broader than the stamen, slightly inflexed, papillose. Pollinarium: corpusculum 0.3 mm long; caudicles $0.1-0.12 \mathrm{~mm}$ long, flattened, straight, horizontal to declinate, trapezoidal; pollinia $0.38-0.4 \mathrm{~mm}$ long, $0.2-0.22 \mathrm{~mm}$ wide, ovate in crosssection, ovoid, laterally attached to the caudicles. Stylar head $1.4-1.5 \mathrm{~mm}$ diam., $0.8-1 \mathrm{~mm}$ high; upper part $0.4-0.45 \mathrm{~mm}$ high, depressed-conical.-Fig. 10, Map 3.

Fruits, seeds and chromosome number unknown.

## Distribution and habitat.-Madagascar, prov. Toliara; $0-100 \mathrm{~m}$; Didierea forest.

Flowering Time.-February.


Fig. 10.-Cynanchum radiatum Jum. \& H. Perrier: A, upper branch with inflorescences; B, flower in top view; C, flower in lateral view; D, gynostegium and corona, partially removed; $\mathbf{E}$, pollinarium; $\mathbf{F}$, stylar head. (Liede \& Conrad 2744). Drawings by Jim Conrad.

MATERIAL STUDIED.-MADAGASCAR: Keraudren 25805, ouest de Janjina, 2.XII. 1970 (P, in spiritu); Liede, Conrad \& Barad 2744, 35 km from Tuléar on road to Morombe, ca. 20 m , 14.II. 1990 (P, TAN).

A rare, climbing species, florally similar to $C$. perrieri and its relatives.
The type of Cynanchum radiatum is problematic, because Jumelle \& PERRIER give just a very short diagnosis, and a locality (JUMELLE \& PERRIER 1911: 257), but, as for all other Cynanchum species they have described, do not indicate a type. For the other Cynanchum-species described by JUMELLE \& PERRIER, typification has been effected by CHOUX, who selected the material from collections of JUMELLE \& PERRIER and these specimens are invariably housed in P. However, for C. radiatum, the comments of CHOUX 1914 do nothing to clarify the concept of the species and he doesn't mention a type, nor is there any specimen annotated by CHOUX in P. However, Choux must have seen material to write his comments, but there is no clue as to collector, number or whereabouts of the material used by CHOUX. It can be assumed that the type is a JUMELLE \& PERRIER collection, but more detail cannot be given. However, the main points of the diagnosis, the corolla lobes fused for about $1 / 4$ of their length, the star-shaped corona, forming a wide angle opposite the corolla lobes, and the almost flat stylar head agree very well with the material found near Tuléar. Therefore, this material is chosen as neotype.

## FOLOTSIA

Folotsia ambovombense Liede, sp. nov.

Inflorescentiis duplicibus, ramis floriferis gracilioribus quam ramis vegetativis; floribus minutis, corona gynostegialis solum partibus interstaminalibus ovalibus effectis; gynostegio stipitato.

TYPE.-Decary 8374 (holo-, P!).
Shoots succulent, prominently glaucous, glabrous; internodes $1.5-2.5 \mathrm{~cm}$ long, $4-5 \mathrm{~mm}$ diam. Leaf scales shortly petiolate, caducous, 1 mm long, $1.1-1.2 \mathrm{~mm}$ wide, triangular.

Inflorescences normally two per node (inflorescence axes much thinner than vegetative stem), sciadioidal, 6-12-flowered, 3-4 flowers open at a time, sessile. Floral bracts $0.5-0.6 \mathrm{~mm}$ long, $0.4-0.5 \mathrm{~mm}$ wide at the base, triangular. Pedicels $2.5-3.5 \mathrm{~mm}$ long, glabrous. Floral buds $1.8-2 \mathrm{~mm}$ long, $1.3-1.5 \mathrm{~mm}$ diam., ovoid, with imbricate aestivation. Calyx lobes $0.7-1 \mathrm{~mm}$ long, $0.4-$ 0.5 mm wide, ovate, apically acute. Corolla subglobose, $1.8-2 \mathrm{~mm}$ long; lobes basally fused, 1 mm wide, incurved, ovate, apically obtuse. Gynostegial corona $1.2-1.3 \mathrm{~mm}$ high, shorter than the gynostegium, consisting of Cs and Ci only basally fused, only Ci differentiated. Lobes of Ci laminar, ovate, inflexed. Gynostegium $0.6-0.7 \mathrm{~mm}$ high, $0.6-0.7 \mathrm{~mm}$ diam., atop a stipe of $0.8-0.9 \mathrm{~mm}$ length. Stamens without filament; anthers about as high as broad, pentagonal, abaxially convex. Anther wings $0.25-0.3 \mathrm{~mm}$ long, extending along the whole length of the anther; adjacent anther wings parallel, basally slightly widened, in the same plane as the anther, basally


Fig. 11.-Folotsia ambovombense Liede: A, habit with inflorescences; note the petiolate leaf scales; B, flower; note the irregularly fused corolla lobes; C, gynostegium and corona, partially removed; D, pollinarium; E, stylar head (Decary 8374); F, fruit. (Labat \& Deroin 2317). Drawings by Jim Conrad.
forming a distinct "mouth". Connective appendages $0.15-0.2 \mathrm{~mm}$ long, $0.24-0.28 \mathrm{~mm}$ wide, ovate, equalling the stamen in width, strongly inflexed. Pollinarium: corpusculum $0.13-0.15 \mathrm{~mm}$ long, ovoid; caudicles very short; pollinia $0.37-0.38 \mathrm{~mm}$ long, $0.14-0.15 \mathrm{~mm}$ wide, ovate in cross-section, clavate, apically attached to the caudicles. Stylar head $0.5-0.55 \mathrm{~mm}$ diam., $0.2-0.3 \mathrm{~mm}$ high; upper part $0.1-0.2 \mathrm{~mm}$ high, flat to depressed-conical.

Follicles one per flower, 60 mm long, 8 mm diam., obclavate, round in cross-section, wingless, apically obtuse, isolatedly muricate.-Fig. 11, Map 5.

Seeds and chromosome number unknown.
DISTRIBUTION AND HABITAT.-Madagascar, prov. Toliara (Ambovombe), Mahajanga; on granite and withered calcareous soil.

Flowering time.-December-January.

Material studied.-Madagascar: Decary 8374, Ambovombe (Behara), 9.I. 1931 (P); Labat \& Deroin 2317 , Ambodiria, 1 km à l'E d'Ambinda (R.N. 9, près d'Antsalova), $100-200 \mathrm{~m}, 5 . \mathrm{XII} .1992$ (K, MO, P, TAN).

This species is difficult to describe from dried material, due to the extreme minuteness of its flowers. This minuteness is probably also the cause for the frequently observed fused corolla lobes, giving the impression of a 3- or 4-merous corolla. However, the pronounced Ci and the extreme smoothness of its stems place it clearly into the Folotsia affinity.

The type specimen bears the annotation "Cynanchum ambovombense, Choux, sp. nov.", a name that was never published. The name for this species has been chosen in accordance with Choux.

Folotsia humbertii Liede, sp. nov.

Ramis succulentibus, glaucibus; corona gynostegialis solum partibus interstaminalibus late triangularibus effectis; gynostegio sessili, antheris crassis, abaxialiter valde convexis.

Type.-Humbert \& Capuron 29382, Madagascar, prov. Toliara, Bevoalava - Ankazondranto, falaise côtière vers l'embouchure de la Menarandra, $1-150 \mathrm{~m}, 12$.III. 1955 (holo-, P!). Only material known.

Plants twining. Shoots succulent, prominently glaucous, glabrous; internodes $5-20 \mathrm{~cm}$ long, $4-8.5 \mathrm{~mm}$ diam. Leaf scales caducous.

Inflorescences normally two per node, sciadioidal, 6-10 flowered, sessile. Floral bracts 0.75 mm long, 0.85 mm wide at the base, deltate, apically glandular, glabrous. Pedicels $7-8 \mathrm{~mm}$ long, glabrous. Calyx lobes basally fused, 1.3 mm long, 1.6 mm wide, broadly ovate, apically obtuse; abaxially apically glandular, glabrous. Corolla cyathiform, 5 mm long; lobes basally fused, 3 mm wide, decurved, triangular, apically acute. Gynostegial corona cyathiform, $3.5-4 \mathrm{~mm}$ high, slightly exceeding the gynostegium, but not obscuring it. C(is) consisting of Cs and Ci fused for more than $1 / 4$ of total corona height, only Ci differentiated. Ci laminar, broadly triangular, erect. Gynostegium sessile, $2.5-3 \mathrm{~mm}$ high, $3-3.5 \mathrm{~mm}$ diam. Stamens without filament. Anthers


Fig. 12.-Folotsia humbertii Liede: A, floriferous branch; B, flower, one corolla lobe removed; C, gynostegium and corona, partially removed, note the massive anthers; $\mathbf{D}$, corona lobe adaxially; E, pollinarium, note the attachment of the pollinia to the corpusculum via the tails of the pollinia; F, stylar head. Drawings by Jim Conrad.

broader than high, massive, abaxially strongly convex. Anther wings, $1-1.2 \mathrm{~mm}$ long, extending along the whole length of the anther; distal ridge smooth; adjacent anther wings parallel to each other, in the same plane as the anther. Connective appendages $0.8-0.9 \mathrm{~mm}$ long, $0.9-1 \mathrm{~mm}$ wide, deltate, narrower than the stamen, strongly inflexed. Pollinarium: corpusculum $0.375-0.4 \mathrm{~mm}$ long, margins of the corpuscular cleft sinuate; caudicles $0.45-0.5 \mathrm{~mm}$ long, cylindrical, s -shaped, convex-concave; pollinia $0.75-0.8 \mathrm{~mm}$ long, $0.3-0.35 \mathrm{~mm}$ wide, ovate in cross-section, oblong; attached to the caudicles along a tail of the pollinium. Stylar head ca. $1.3-1.4 \mathrm{~mm}$ diam., ca. $0.5-0.6 \mathrm{~mm}$ high; upper part $0.1-0.15 \mathrm{~mm}$ high, umbonate.-Fig. 12, Map 5.

Fruits, seeds and chromosome number unknown.
DISTRIBUTION AND habitat.-Madagascar, prov. Toliara; 1-150 m ; xerophytic bush on limestone.

FLOWERING TIME.-March.
The only specimen known exhibits the thick, extremely smooth stems of Folotsia together with the typical coronal emphasis on Ci . The sessile gynostegium, the massive anthers, and the shape of the pollinarium, however, are not matched in other species of the genus. Taking into account the inadequate material, a preliminary placement of the taxon into Folotsia seems to be a better solution than the creation of a new genus.

The species is named to honour H. HUMBERT, the great phytogeographer of Madagascar.

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# Nouveautés taxonomiques concernant le genre Dalbergia (Fabaceae) dans la péninsule Indochinoise (Thaillande, Cambodge, Laos et Viêtnam) 

C. Niyomdham \& Pham Hoang Hô

Résumé : La révision du genre Dalbergia pour la Flore du Cambodge, du Laos et du Viêtnam et pour Flora of Thailand a fait apparaître les nouveautés taxonomiques suivantes : 3 espèces nouvelles (D. darlacensis Pham Hoang Hô \& C. Niyomdham, D. suthepensis C. Niyomdham, D. vietnamensis Pham Hoang Hô \& C. Niyomdham), une variété nouvelle (D. velutina Benth. var. annamensis C. Niyomdham) et 8 combinaisons nouvelles.

Summary: The revision of the genus Dalbergia for the Flore du Cambodge, du Laos et du Viêtnam and for Flora of Thailand has led to establish the following taxonomic novelties: 3 new species (D. darlacensis Pham Hoang Hô \& C. Niyomdham, D. suthepensis C. Niyomdham, D. vietnamensis Pham Hoang Hô \& C. Niyomdham), a new variety (D. velutina Benth. var. annamensis C. Niyomdham) and 8 new combinations.

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Gagnepain, en 1916, avait recensé dans la Flore Générale de l'Indochine 35 espèces et 3 variétés. CRAIB, en 1928, énumérait 30 espèces et 4 variétés dans sa Flora Siamensis Enumeratio. Après une étude réalisée par Pham Hoang Hô, en 1990, la révision a été complétée et remaniée par C. Niyomdham, en 1993; cette révision compte 25 espèces et 7 variétés pour la Thailande et 29 espèces et 7 variétés pour l'ensemble du Cambodge, du Laos et du Viêtnam.

Cet article, précurseur de Flora of Thailand d'une part et de la Flore du Cambodge, du Laos et du Viêtnam d'autre part, est basé sur des observations de terrain et sur des collections en provenance de plusieurs Herbiers (AAU, BK, BKF, C, E, K, L, P).

Les nouveautés sont énumérées ci-dessous dans l'ordre alphabétique.

Les références bibliographiques sont réduites à l'essentiel pour les espèces décrites dans la révision de la tribu des Dalbergieae pour l'Inde, de Thothathri (1987).

## Dalbergia assamica Benth.

in Miq., Pl. Jungh. 2 : 256 (1852). - Type : Griffith 546, Inde (lecto-, K).
Dalbergia lanceolaria L. f. var. assamica (Benth.) Thoth., Bull. Bot. Surv. India 25 : 171 (1983); Tax. Revis. Dalbergieae: 144 (1987).
D. balansae Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70 : 54 (1901); Gagnepain, Fl. Gén. Indoch. 2 : 487 (1916), syn. nov. - Type : Balansa 2289, Viêtnam (lecto-, P, choisi ici ; isolecto-, P).
var. assamica

Inde, Sikkim, Birmanie, Chine (Guangdong, Guizhou, Hainan, Yunnan), Thaïlande, Laos, Viêtnam, dans les forêts mixtes décidues et les forêts sèches sempervirentes, de 50 à $800(-1500) \mathrm{m}$ d'altitude.
var. laccifera (Eberhardt \& Dubard) C. Niyomdham, comb. nov.
D. hupeana var. laccifera Eberhardt \& Dubard, Bull. Mus. Hist. Nat. (Paris) $15: 385$ (1909); Gagnepain, Fl. Gén. Indoch. 2: 498 (1916). - Type : Eberhardt s.n., Viêtnam (holo-, P).

L'examen du type (fragments de folioles et fleurs) montre un réseau de nervures et des caractères floraux plus semblables à ceux de $D$. assamica qu'à ceux de $D$. hupeana.

Cette variété se distingue de la var. assamica par les gousses linéaires plus petites, de 5$6 \times 1,3-1,5 \mathrm{~cm}$, généralement à $2-3(-4)$ graines réniformes, de $5 \times 7 \mathrm{~mm}$, brun-rougeâtre.

Matériel étudié. - Viêtnam : Eberhardt s.n., (Tonkin-Laos), s.d. (P); Poilane 20005, Nghê Tinh, km 216 de la route $\mathrm{n}^{\circ} 7,500 \mathrm{~m}$, fr., fév. 1922 (P).

## Dalbergia cana Graham ex Kurz

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 70 (1873); Thoth., Tax. Revis. Dalbergieae : 172 (1987).

- Type : Wallich 5859, Birmanie (holo-, K; iso-, CAL, LE).

Dalbergia kerrii Craib, Bull. Misc. Inform. : 43 (1911); Gagnepain, Fl. Gén. Indoch. 2: 495 (1916), syn. nov. - Type : Kerr 1033, Thailande (holo-, K).
D. kurzii Prain var. truncata Craib, Fl. Siam. Enum. 1: 480 (1928), syn. nov. - Type : Kerr 10513, Thaïlande (holo-, K; iso-, C).

